GENERAL KIDDIE RIDES INC.

730 NOLANA MC ALLEN, TEXAS 78504
PHONE (512) 630-0770 TELEX 386192 TELECOPY 630-5313

Serial #00533
USA ID #07240

JR PIRATE SHIP
Circle H Christian Amusement)

RIDE: Pirate Ship
MFG: Kiddie Rides

Timer -
Square D
Part #9050
Type - JCK
On Delay in
off Delay
0-180 s

ASSEMBLING OF BASE

STEP 1: Choose plain and level ground.

STEP 2: Unscrew the four legs and take off the transportation chains (Fig. A).
Legs will be left hanging (Fig. B).

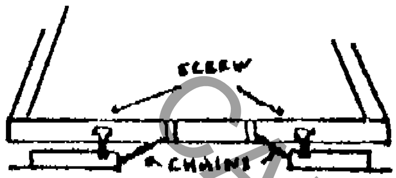


FIG A

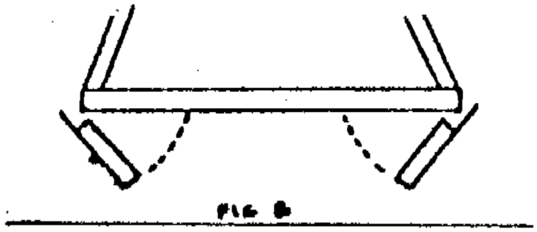


FIG B

STEP 3: Place jack on the hinder part and lift sufficiently so that the back legs can lower completely and remain vertical (Fig. C).

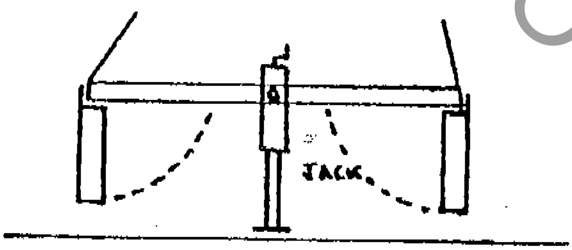
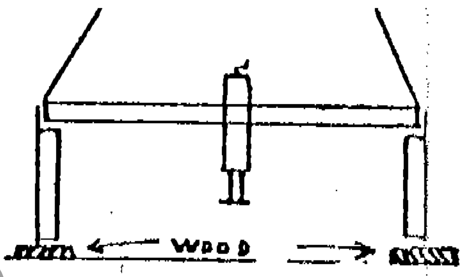
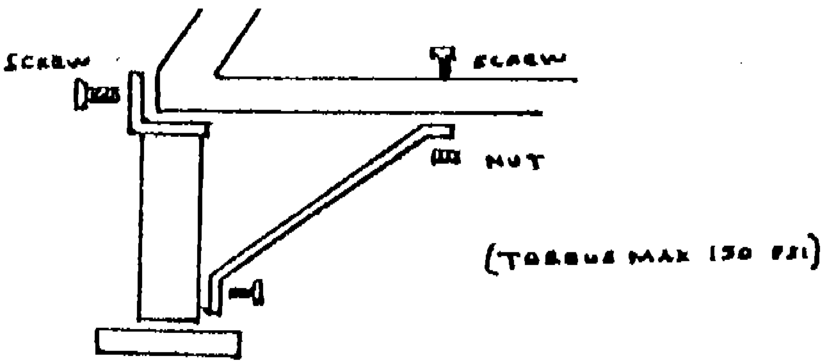


FIG C



STEP 4: Level legs and wedge with wood 1" x 25" x 6" (Fig. D).

STEP 5: Screw legs on the sides of the chassis and place the diagonal interior support (Fig. E).



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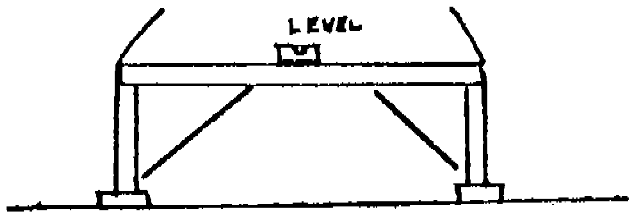
STEP 6: Check the level which should remain at "O" totally horizontal (wedge legs if necessary).



STEP 7: Remove jack and change it to the front and repeat the same procedure as above on the front legs. Remove jack and put it away in its place.

STEP 8: Remove the ship's transportation security screws (Fig. F).

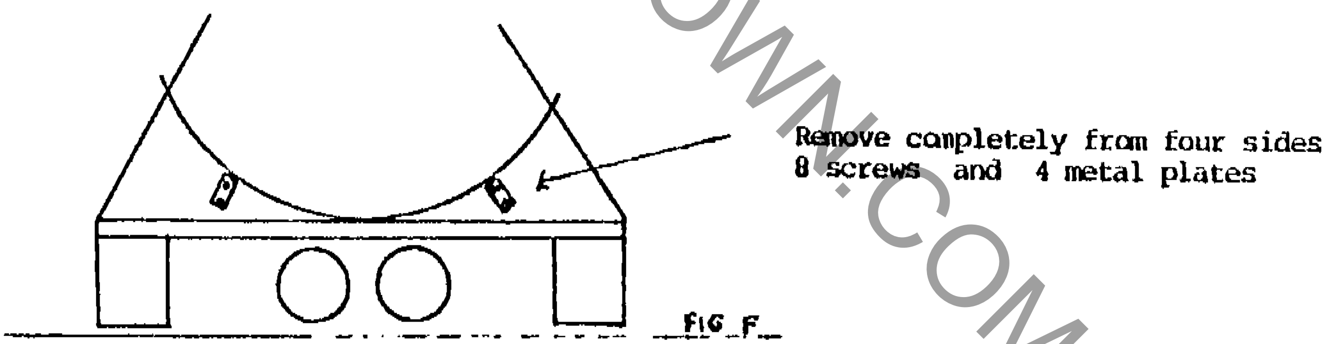


FIG F

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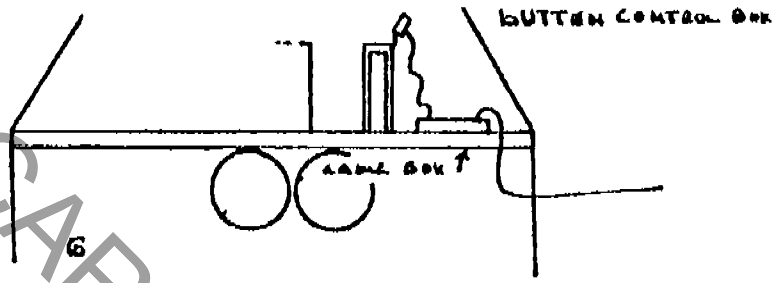
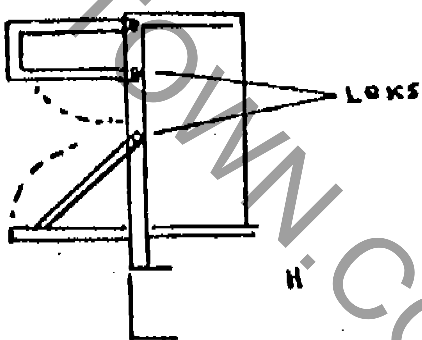
STEP 11: Place canvasses laterally. Place 10 watt light bulbs.

STEP 12: Take out from cable box the button control and put it in its place.
Lay out feed cable (Fig. G).



STEP 13: Lower stairs.

STEP 14: Lower operator's platform and railing. Place security locks (Fig. H).



STEP 15: Check that all thermomagnetic switches be off in the control box (Down position "OFF" ("O")).

STEP 16: Connect electric feed cable 3 phases, 220 volts, 60 cycles, ground and neutral.

STEP 17: Test air compressor (Switch No. 2).

STEP 18: Fill the air tank 100 PSI (Maximum).

STEP 19: Test lights (Switch No. 3 and 4).

STEP 20: Adjust timer at 90" (Switch No. 5).

STEP 21: Open compressor valve.

STEP 22: Turn on motor (Switch No. 1).

STEP 23: Press starting button (yellow button).

A) The motor should start and spin clockwise

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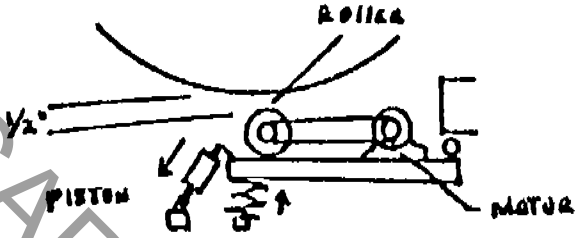
B) The piston and the roller (that drive) should comedown simultaneously and the ship should become free. (In case that the motor should spin counter clockwise the phases should be interchanged.



STEP 24: To start the boat swinging press black button 1" or 2" seconds and "Release". This will drive the ship forward, wait until it swings for 2 or 3 seconds. Repeat the same procedure until the ship reaches the height of 180 degrees. (Release the button when the ship swings back).

Be careful not to press the button when the ship is swinging backward because this would only make it stop and consequently force the motor. Also, the black button should not be pressed longer than necessary because this will cause a premature wearing out of the roller and an overheating of the motor.

The operator should practice several times and normally the ship will reach 180 degrees in 10 or 12 swings.

STEP 25: The motor will stop in 90' seconds according to the stablished adjustable timer and electrical brake will function automatically.

STEP 26: To stop the ship in caseof an emergency press the red button and the ship will stop in 0 or 2 swings maximum, depending upon the height and position in which it is at the moment that the brake is applied.

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GENERAL INFORMATION

In case of failure of the elctrical power the brake will function automatically.

It is convenient for a better lasting of the rubber roller, not to use the brake when the ship is swinging at its maximum (180 degrees), the ideal is to give it drive up and then let it swing freely until the automatic brake is applied.

FAILURES	POSSIBLE CAUSES	SOLUTIONS
THE MOTOR STARTS BUT THE PISTON DOESN'T COME DOWN	* Lack of air in the compressor	Check Compressor
	* Valve of the compressor closed	Open Valve
	*Doesn't have enough pressure	Regulate Compressor Min. 60 PSI Max. 100 PSI
	* Broken hose or leakage	Change or patch hose
	* Bobbin of electric valve burned	Change bobbin (Festo)
	* Air leakage in piston	Change packing (Festo)
MOTOR DOESN'T START	Loose cables	Check cables
	Thermic switch off due to overheating of motor	Wait 10 minutes for motor to cool off.
THE MOTOR HUMS BUT DOESN'T WORK	Lack of one phase (Turn motor off immediately because it might burn out)	Check Cables Check thermic switch

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FAILURES	POSSIBLE CAUSES	SOLUTIONS
NOISE IN MOTOR WHEN STARTING IT AND TURNING IT OFF	* Unadjusted brakes	Adjust brakes
	* Broken shoe and lining	Change shoe or Lining
	* Broken bearing	Change bearing

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LUBRICATION

The following relubrication intervals are suggested as a guide for long operating life:

	NORMALLY	HIGH AMBIENTS, DIRTY OR MOIST LOCATIONS
2 Bearings of the principal axle	3 Months	1 Month
2 Bearings of the motor	6 Months	3 Months
2 Bearings of the Rubber Roller	3 Months	1 Month
4 Plugs of the motor base	6 Months	3 Months

LUBRICANT

All the bearings are pre-greased normally with Shell Oil Company's "Dolium R". Several equivalent greases which are --- compatible with the furnished grease are Chevron Oil's"SRI No. 2" and Texaco Inc. "Premium RB".

CAUTION: Keep grease clean. Lubricate bearings at standstill. Remove and replace drain plugs at standstill. Do not mix petroleum grease and silicone grease in bearings.

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Actually, our ride is a physical pendulum that has been named as such: "Physical Pendulum". It is like any -- simple real pendulum, except that the mass of the pendulum is - not concentrated on one point. The figure shows an irregular-shape body that can rotate around a horizontal axis without any friction and which has been separated from its balance (equilibrium) position by an "θ" angle.

The figure shows:

l The distance from the axis to the center of gravity.

I The moment of inertia of the pendulum in regard to the axis of rotation.

m The mass of the pendulum.

1.- The recuperating moment in the shown position is:

$$= mgl.\text{sen}$$

2.- The pendulum is submitted to an elastic recovery pair with the following constant:

$$k = m\ g\ l$$

3.- Therefore, the oscillation period is:

$$T = 2\pi\sqrt{\frac{I}{m\ g\ l}} = 2\pi\sqrt{\frac{I}{k}}$$

4.- The moment of inertia is:

$$I = \frac{m\ l^2}{3}$$

where: $g = 9.8\ m\ /\ seg.$

and: $l = \frac{L}{2}$

Our ride involves a physical pendulum that weighs 1500 Kg., and has a 3 meter length ("L").

a.- Its mass will be:

$$m = \frac{1500}{9.8} = 153.061\ u\ t\ m.$$

b.- Its moment of inertia; according to the following formula:

$$I = \frac{m\ L^2}{3}$$

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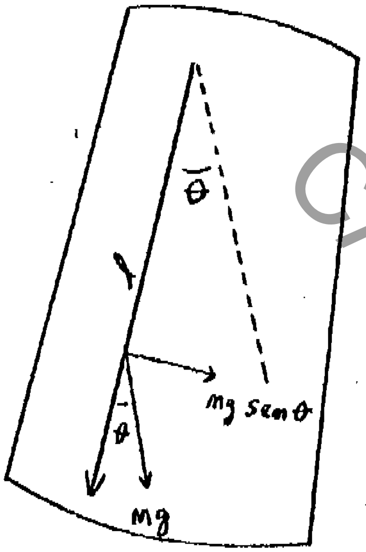
$$I = \frac{153.06122 \times 3^2}{3} = 459.183 \text{ u t m.}$$

c.- The center of mass "l" according to the formula

$$I = \frac{T^2 \; m \; g \; l}{4}$$



We solve for

$$l = \frac{I \cdot 4}{T^2 \cdot m \cdot g}$$

And calculate T

$$T = 2\pi \sqrt{\frac{2L}{3g}}$$

$$T = 6.283185 \sqrt{\frac{6}{29.4}}$$

$$T = 2.8384534$$

Substituting values for "l"

$$l = \frac{459.183 \times 4 \times 9.869604}{"2.85 \times 153.061 \times 9.8}$$

Where l = 1.50 mts

$$l = \frac{L}{2}$$

In our physical pendulum we have:

mass = 153.061 moment of inertia = I = 459.183 u t m

Its period = T = 2.83 and its distance l = 1.50 mts.

CENTER OF OSCILLATION . - It is always possible to find an equivalent simple pendulum whose period of oscillation is equal to that of the physical pendulum:

If "L" is the length of an equivalent simple physical pendulum

$$T = 2\pi \sqrt{\frac{L}{g}} = 2\pi \sqrt{\frac{I}{mgl}}$$

or else $L = \dfrac{I}{ml}$

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Thus, in what regards the period of oscillation, the mass of the physical pendulum may be considered as concentrated on a point whose distance to the axis is:

$$L_o = \frac{I}{m.l}$$

This point is called the center of oscillation of the PENDULUM.

In our case:

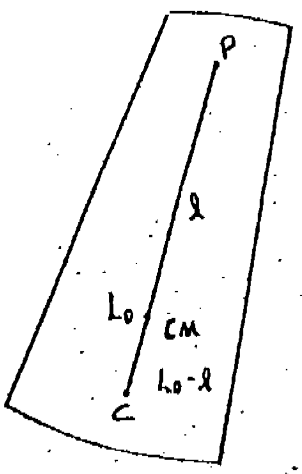
$$L_o = \frac{I}{m.l}$$

Where:

$$L_o = \frac{459.183 \text{ u t m}}{153.061 \text{ u t m} \times 1.50 \text{ mts}}$$

$$L_o = 2 \text{ mts}$$

RADIUS OF GYRATION. - The radius of gyration or constant "k" may be calculated as follows:



$$k = \sqrt{\frac{I}{m}}$$

Where values:

$$k = \sqrt{\frac{459.18}{153.061}} = 1.7320$$

Thus, we have found 3 different values:

$l = 1.50$ mts $k = 1.73$ mts $L = 2$ mts

l, k and L are three different distances on which the mass of the pendulum may be consi-dered as concentrated.

The figure represents a pendulum (a body) that can oscillate around an axis that passes through "P" and whose center of oscillation is on point "C".

The center of oscillation and the supporting point have the following property: if the pendulum is caused to oscillate around a new axis passing through "C", its period of oscillation will not vary and point "P" will become the center of oscillation. They combine and depend from each other.

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RECUPERATING FORCE. -

The figure represents the forces imposed on the mass of the pendulum when its enlongation is:

" x "   x = L.

Let us select two axes, one following the direction of the tangent and the other one following the direction of the radius and let us break down the weight = m g by its components according to said axes.

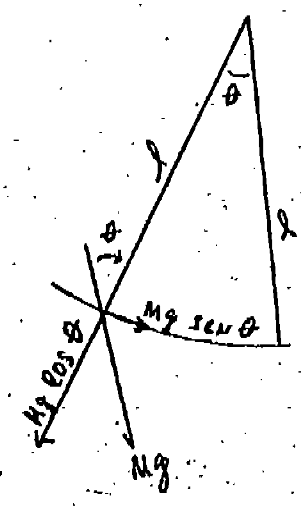
The recuperating force "F" is:

$$F = m g \text{ sen } \theta.$$

For our 1500 kilos pendulum the values according to the angle formed will be:

θ	- m g sen θ	m g cos θ
10°	260.472	1477.211
20°	513.030	1409.538
30°	750.000	1299.038
40°	964.181	1149.066
45°	1060.660	1060.660
50°	1149.066	964.181
60°	1299.038	750.000
70°	1409.538	513.030
80°	1477.211	260.472
90°	1500.000	0.000

MOMENT OF RECUPERATION. -



The moment of recuperation is obtained by the product of the recuperating force by the distance to the axis or lever arm

$$F' = m g l \text{ sen } \theta$$

In our case l = 1.50 mts

Where the values for our angle are:

θ	F'
10°	390.708
20°	769.545
30°	1125.000
40°	1446.271
50°	1723.599
60°	1948.557

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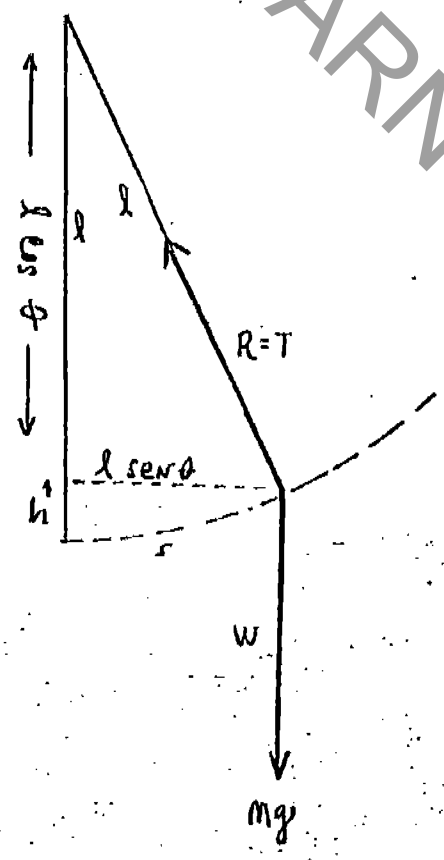
70°	2114.307
80°	2215.816
90°	2250.000 kilograms.

Tangentially and normally breaking down the forces, the movement equations in regard to the path will be:



$$\frac{W}{g}\,\frac{dv}{dt} = - W \text{ sen.}$$

$$\frac{W}{g}\,\frac{v^2}{l} = R - W \cos\theta .$$

$$R = \frac{W}{g} \cdot \frac{v^2}{l} + W \cos\theta$$

Making equal the kinetic power and the potential power

E C = E P.

$$\frac{m\,v^2}{2} = m\,g\,h$$

$$m\,v^2 = 2.\,m\,g\,h$$

$$v^2 = 2\,g\,h$$

However, $h = l - l\cos\theta. = l\,(1 - \cos\theta$

$$v^2 = 2\,g\,l\,(1 - \cos\theta.)$$

$$v = 2\,g\,l\,(1 - \cos\theta.)$$

Substituting in R the value of v^2

$$R = \frac{2\,g\,l\,(1 - \cos\theta.)}{l}\,\frac{W}{g} + W\cos\theta.$$

$$= (2 - 2\cos\theta.)\,W + W\cos\theta.$$

$$= 2\,W - \cos\theta.$$

$$T = R = W\,(2 - \cos\theta.)$$

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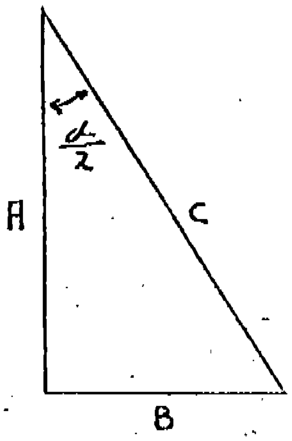
In our 1500 kilos pendulum we may find the "STRESS" that are the strains that it would produce over a cable supporting same at different angles, as follows:

θ	$T = R = W\ (2 - \cos \theta.)$
10°	1522.788
20°	1590.461
30°	1700.961
40°	1850.933
45°	1939.339
48°	1996.304
50°	2035.818
60°	2250.
70°	2486.966
80°	2739.527
90°	3000.



The structure from which our ship is suspended has the form of an isosceles triangle. The size of its equal sides is 3 meters, as shown on the figure.

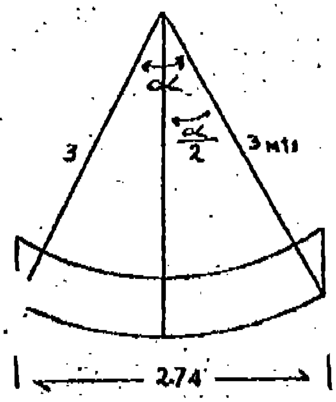
Thus, we find $tg = \frac{\alpha}{2} = \frac{1.37}{3} = 0.456667$

$$\frac{\alpha}{2} = 24.30$$

$$\angle \alpha = 49°$$

$$\angle B = 65.7$$

$$65.7° + 24.3° = 90° = 180°$$



STRAINS ON THE STRUCTURE AT REST. - The maximum force that we have found, i.e. "THE STRESS" that holds the ship as per a 90°angle is 3000 kilograms. With a 1 to 10 safety factor, we would calculate 30,000 kilos.

According to moments, the load on each end will be $\frac{Q}{2}$

$$\frac{Q}{2} = 15000 \text{ kilos}$$

Said load would be distributed on two frames, each one

supporting $\frac{Q}{4} = 7500$ kgs.

In our figure $Tg\ \frac{\alpha}{\ } = \frac{B}{\ }$

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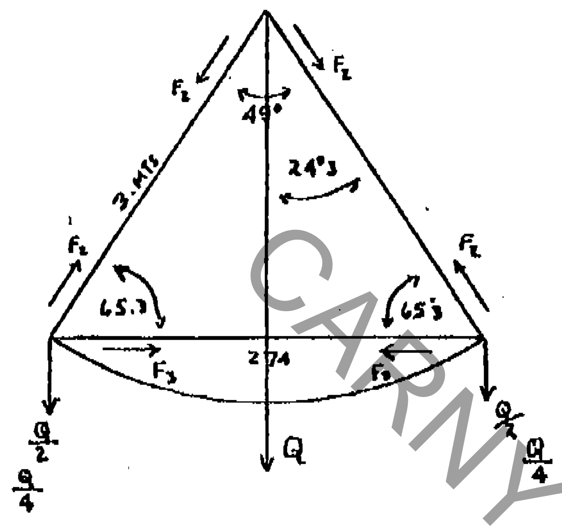


$Tg\ 24°30' = \frac{B}{7500}$

B = 7500 x 0.4557263

B = 3417.93 kilos (compressive)

And our second force:

$$C = \frac{A}{\cos \alpha/2}$$

$$C = \frac{2500}{0.9114033}$$

C = 8229.06 kilos (traction)

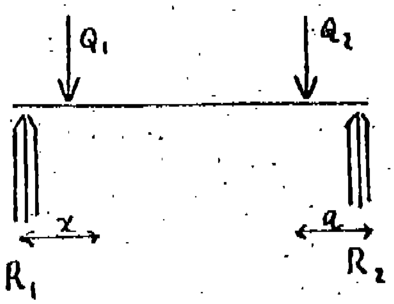
Each one of our tension members will be subject to a force amounting to 8229 kilos (tractive force). Each one of the sides of our boat will be subject to a 3417.95 kilogram force (compressive)

MOMENTS OF FORCES.-

CENTRAL SHAFT.- Our case involves a shaft resting on its ends that is also used as a loading beam with two equally concentrated loads at the same distance from center.

Our formula $M_{max} = Q.\ A$

$M_x = Q.\ x$



Thus, we divide by two our load after taking into consideration the 1 to 10 safety factor and 30 000 kilos -symmetrically- obtaining 15 000 kilos for each side.

The reaction on supports is equal to the load. Thus:

R = R = Q = Q

15 000 = 15 000 = 15 000 = 15 000.

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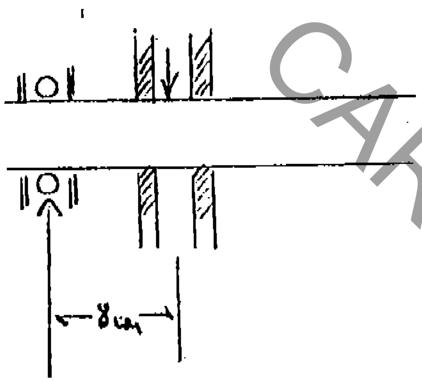
MOMENTS.- The shaft embedded with uniform distribution of load.

$$M_{center} = \frac{Q\,l^2}{24}$$

The moment on each end:

$$M_a = M_b = -\frac{Q\,l}{12}$$



In our case, distance l from the load to the support point is 8 cms.
Thus, our loads would be:

$$M = \frac{Q\,L}{12} = \frac{15000 \text{ kilos} \times 8 \text{ cms}}{12}$$

$M =$ 10 000 kilograms x cm.

According to the following formula:

$$\sigma = \frac{M}{\ }.f\,\frac{y}{I} = \frac{M\ (D/2)}{\pi D / 64}$$

$$\text{and } D = \sqrt[3]{\frac{64\,M}{2\pi\sigma}}$$

where $M = Q\,l = 15\,000 \times 8 = 120\,000$ k

Giving values, we have:

$$D = \sqrt[3]{\frac{64 \times 120\,000}{2 \times 3.14 \times \sigma}} = 6.47 \text{ cms diameter}$$

where σ for colrol - 1018 = 4500 kg/cm.

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THE SUPPORTS THAT HOLD OUR PHYSICAL PENDULUM. -

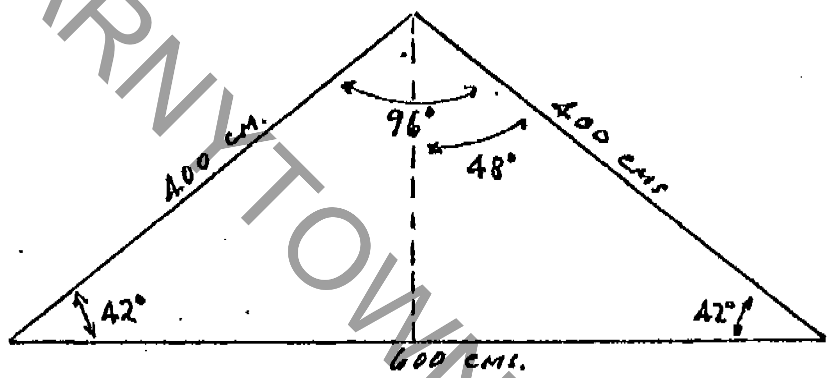
Our ship, with its tension members, festure the following sizes:

2 struts that form a 96° angle on top.

1 horizontal base that forms, together with the above struts, a 42° angle.

The struts are 400 cms. long.

The horizontal base is 600 cms. long.

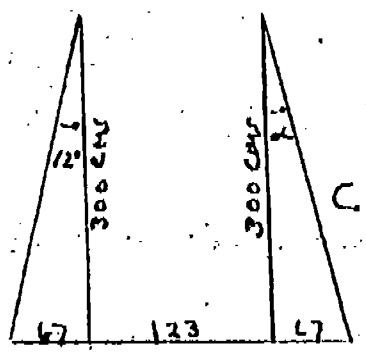


The struts do not fall perpendicularly upon the base; instead they are separated from said perpendicular position by 67 cms. Thus by a simple calculation, we may find the angle.

$$Tg = \frac{67}{300} = 12 \quad 58927$$

$$= 12 \quad 35$$

This allows our ship to oscillate without any approaching risk.



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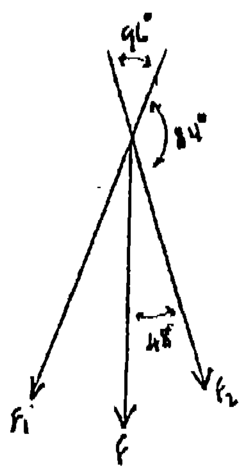
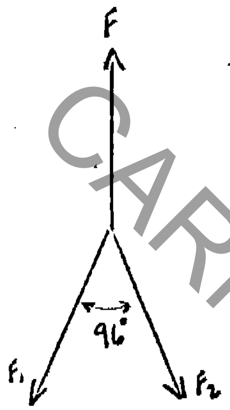
STRAINS ON SUPPORTS HOLDING OUR PHYSICAL PENDULUM.-

To calculate the above strains we take into conside ration the "Stress" caused by the weight of the ship at different angles:





1.- When our physical pendulum is in the vertical position (the center of mass)

Angles formed:

Between F_1 & F_2 = 96°

Between F_2 & F = 48°= 84°= 132°

Between F_1 & F = 48°+ 84°= 132°

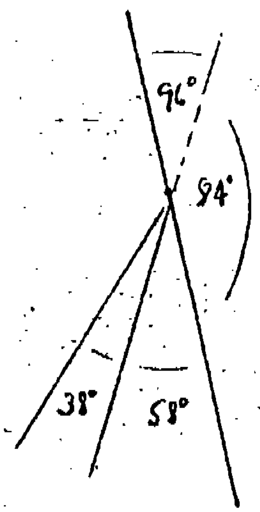
96 + 132 + 132 = 180°

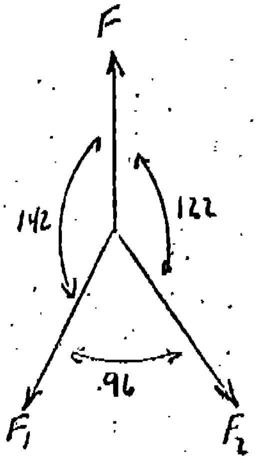
According to the sine law:

$$\frac{F}{\text{sen } 96°} = \frac{F}{\text{sen } 132°} = \frac{F}{\text{sen } 132°}$$

We obtain:

If F = 1500
F_1 = 1120.85
F_2 = 1120.85





2.- When our physical pendulum's center of mass is displaced 10 in regard to the vertical position.

Stress = R = W (2 - cos θ.)
Strees = 1522.78

Angles formed:

Between F_1 & F_2 = 96°

Between F_1 & F = 84°+ 58°= 142°

Between F & F_2 = 84°= 38°= 122°

96 + 142 + 122 = 360°

According to the sine law:

$$\frac{F}{\text{sen } 96°} = \frac{F}{\text{sen } 122°} = \frac{F}{\text{sec } 142°}$$

We get:

If F = 1522.78
F_1 = 1298.50
F_2 = 933.34

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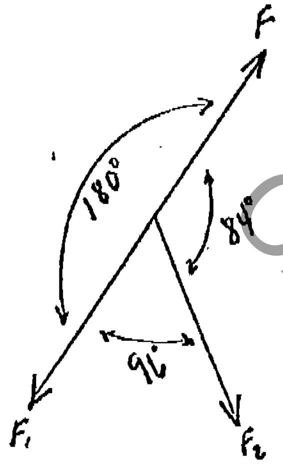


3.- Operating in the same way, we find that: When the angle is 20°

$T = R = F = 1590.46$
$F_1 = 1482.77$
$F_2 = 750.78$

When the angle is 30°

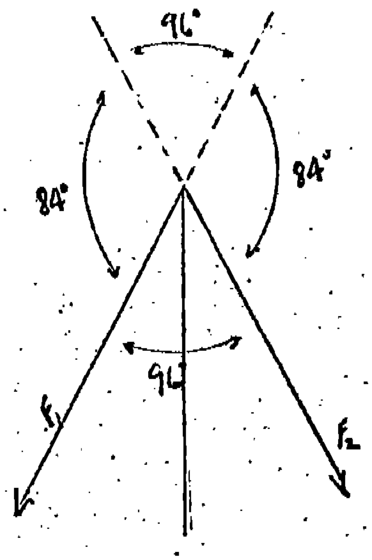
$T = R = F = 1700.96$
$F_1 = 1672.96$
$F_2 = 528.52$

When the angle is 40°

$T = R = F = 1850.93$
$F_1 = 1859.99$
$F_2 = 259.01$

When the angle is 45°

$T = F = 1939.33$
$F_1 = 1947.33$
$F_2 = 102.05$



4.- When our physical pendulum is displaced 48°in regard to the vertical position, our center of mass is in the same direction of one of the support's arms:

$\text{Stress} = R = W(2 - \cos\theta.)$
$\text{Stress} = 1996.30$

Angles formed

Between F_2 & F_1 = 96°
Between F_1 & F = 84°+ 96°= 180°
Between F_2 & F = 84°

According to the sine law:

$$\frac{F}{\text{sen } 96°} = \frac{F}{\text{sen } 84°} = \frac{F}{\text{sen } 180°}$$

We get:

If $F = 1996.30$
$F_1 = 1996.30$
$F_2 = 0$

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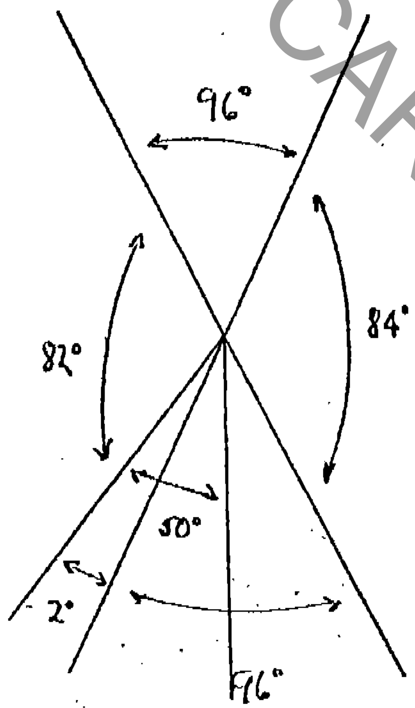

5.- When our physical pendulum is displaced 50°in regard to the vertical position, the supports's tension has been released and our forces have the following values:

Stress 50° = 2035.81

Angles formed:

Between F_1 & F_2 = 96°

Between F & F_1 = 2°

Between F_2 & F = 84°+ 96°= 82°= 262°

96°= 2°= 262°= 360°

According to the sine law:

$$\frac{F}{\text{sen } 96°} = \frac{F}{\text{sen } 262°} = \frac{F}{\text{sen } 2°}$$

We get:

F = 2035.81

F_1 = -2027.10

F_2 = 71.44

6.- Operating in the same way, we get:

When the angle is 60°

T = R = F = 2250

F_1 = -2151.66

F_2 = 470.37

When the angle is 70°

T = R = F = 2486.96

F_1 = -2619.44

F_2 = 1111.34

When the angle is 80°

T = R = F = 2739'52

F_1 = -2170.66

F_2 = 1459.72

When the angle is 90°

T = R = F = 3000

F_1 = -2018.44

F_2 = 2018.44

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The following is a chart that shows the variation of forces on the structure's tension members that support the ship:

θ	R = W (2 - con θ.) Stress	Tension member F_1	Tension member F_2
0°	1500	-1120.8	-1120.8
10°	1522	-1298.5	- 933
20°	1590	-1482.7	- 750
30°	1700	-1672.9	- 528
40°	1850	-1859.9	- 259
45°	1939	-1947.3	- 102
48°	1996	-1996	0
50°	2035	-2027.1	71.4
60°	2250	-2151.6	470.3
70°	2486	-2619.4	1111.3
80°	2739	-2170.6	1459.7
90°	3000	-2018.4	2018.4

The highest force found when making our force analysis amounts to 3000 kilos.

Providing our ride with a 1 to 10 safety factor, we would establish our force in 30 000 kilos

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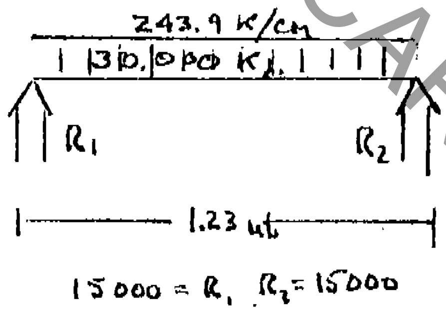
SHEARING STRESS ON CENTRAL STRUCTURE:

We have found that our load after considering a 1 to 10 safety factor is Q = 30 000 kilos.

Symmetrically, for each one of the sides, it would be: Q/2.
15 000 kilos of load on each side.
Reactions R for said load would also be R / 2.
15 000 kilos of reaction on each side.



The shearing stress at an " x " distance will be:

$$T = R - \frac{Q}{cms} \cdot X$$

Where Q/cms = 15 000 / 123 = 243.9
and Q = 15 000
the distance will be: x = 8 cms.
Substituting values:

T = 15 000 - 243.9 x 8.
= 15 000 - 1951.2
= 13048 kilograms

BENDING MOMENT. -

The bending moment will be obtained by the following formula:

$$M = R x - \frac{Q}{cms} \cdot \frac{x^2}{2}$$

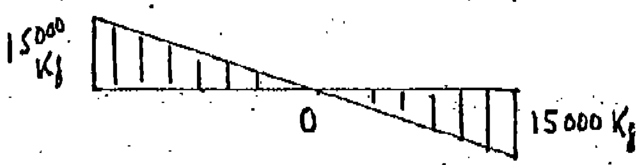
For a load Q = 15 000 kilos

Q/cm = 243.9

where x = 8 cms

$M = 15\ 000 \times 8 - 243.9 \times 8^2/2$
= 120 000 - 78048
= 41952 kilograms

The structure's shearing strengh graph is shown in the figure; same has no value at center but is maximum on ends.



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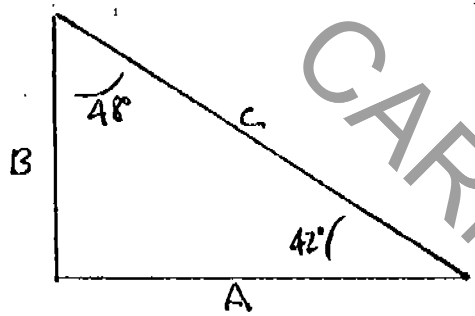
The forces on our support's struts, when the latter form angles on the structure and calculating same taking into consideration the value obtained with a 1 to 10 safety factor.

30 000 kilos total load on center
7500 kilos load per strut
The struts with the vertical form a first angle of 48



Where $C = \dfrac{7500}{\cos 48}$

$C = 11\ 208.57$ kilos

The second angle formed is 12

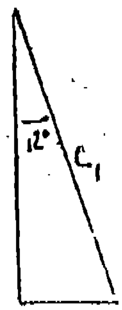
Where $C_1 = \dfrac{11\ 208.57}{\cos 12}$

$C_1 = 11\ 458$ Kilos

Our force on struts has a value of 11 458 Kilos

Taking the iron strain as 1200 kilos / cm^2

$$\frac{11\ 458}{1\ 200} = 9.548\ cm^2$$

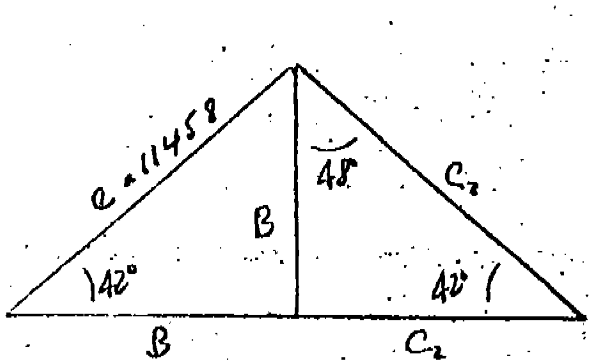


Our base tension members form, with our struts a 42° angle
Where if the force shows on the diagram is 11 458 kilos

We have that $C_2 = \dfrac{11458}{\cos 42} = 15418.26$

Taking the iron strain as 1200 kilos /cm^2

$$\frac{15\ 418.26}{1\ 200} = 12.8485\ cm^2$$



MATERIAL USED	TENSILE STRENGTH	M. INERTIA	M. BENDING	AWS	ASME	AISI/SAE/ASTM
Axel-iron 9840 treated 4"Ø						9840
Welding E7018 Infra.	73000 81000 psi 51-57 Kg/mm^2		68000 75500 psi 48-54 Kg/mm^2	A5.1	SFA5.1	
Tube P.T.R. 31/2 x 31/2	19,388 Kg	191.65 cm^4	51739 Kg			
Tube Channel 6 x 4	36,774 Kg	977.00 cm^4	153858 Kg			
Screw and nuts 1" Ø L 9	109,080 Lbs		87870 Lbs			Rockwell C-38-42
Gears 4"x3/4						8620

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CASE CHANNEL 6" x 2"

Two will be used to form a 6" x 4" case.

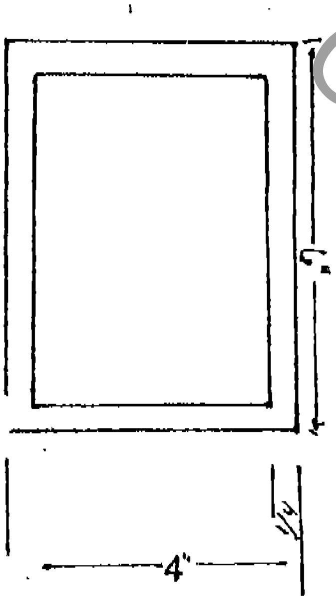
CHARACTERISTICS:

1.- Iron area in cm^2

$15.24 \times 2 \times .635 = 19.3548$

$8.89 \times 2 \times .635 = 11.2903$

30.6451 cms^2



2.- TRACTION

Being iron, we may consider 1200 kgs / cm^2

$30.6451 \times 1200 = 36774$ kilos

3.- MOMENT OF INERTIA:

The formula of the moment of inertia for a rectangle:

$$I_x = \frac{b\ h^3}{12}$$

For a hollow rectangle is:

$$I_x = \frac{b_1\ h_1^3}{12} - \frac{b_2^2\ h_2^3}{12}$$

Giving numerical values:

$$I_x = \frac{1}{12}(10.16)(15.24)^3 - \frac{1}{12}(8.89)(13.9$$

$$I_x = 2996.86 - 2019.80$$

$$I = 977.05\ cms^4$$

4.- BENDING MOMENT

$\sigma = 1200$ kilos

$I = 977.05\ cms^4$

$y = 7.62$

$$M = \frac{1200 \times 977}{7.62}$$

$M = 153858$ kilograms

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Calculus by centripetal force in circular movement.

According to formula:

$$F = \frac{MV^2}{R}$$

Obtaining the following values:

M = 1500 Kg weight of the pendulum plus 1000 kg weight of the load

$$M = \frac{2500}{9.8} = M = 255.10$$

$$V = \sqrt{2\ hg} = \sqrt{2.981.600} = 1084.4363 \text{ cms/s}$$

$$V = 10.84 \text{ M/S}$$

$$R = 3.00 \text{ Mts.}$$

Substituting

$$F = \frac{255.1 \times 10.84^2}{3}$$

$$F = 9{,}991 \text{ N}$$

That divided by our four tension members hold the ship

$$\frac{9{,}991}{4} = 2{,}497 \text{ N. by tension members}$$